

We Claim:

1. A method for the expression of a nucleic acid sequence of interest in flax seeds comprising:

(a) preparing a chimeric nucleic acid construct comprising in the 5' to 3' direction of transcription as operably linked components:

- (1) a seed-specific promoter obtained from flax; and
- (2) said nucleic acid sequence of interest wherein said nucleic acid of interest is non-native to said seed-specific promoter;

(b) introducing said chimeric nucleic acid construct into a flax plant cell; and

(c) growing said flax plant cell into a mature flax plant capable of setting seed

wherein said nucleic acid sequence of interest is expressed in the seed under the control of said seed-specific promoter.

2. The method according to claim 1 wherein at least one expression characteristic conferred by said seed-specific promoter to its native nucleic acid sequence is conferred to said non-native nucleic acid sequence.

3. The method according to claim 2 wherein said expression characteristic is timing of expression, level of expression, response to a change in lighting conditions, response to a change in temperature, response to a change in concentration of a chemical agent.

4. The method according to claim 1 wherein said flax seed-specific promoter is selected from the group of promoters comprising, oleosin promoters, 2S storage protein promoters and legumin-like seed-storage protein promoters.

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5. The method according to claim 1 wherein said flax seed-specific promoter comprises:

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- (a) a nucleic acid sequence as shown in Figure 1 (SEQ.ID.NO.:1), Figure 2 (SEQ.ID.NO.:4), Figure 3 (SEQ.ID.NO.:6) or Figure 4 (SEQ.ID.NO.:8) wherein T can also be U;
- (b) a nucleic acid sequence that is complimentary to a nucleic acid sequence of (a);
- 10 (c) a nucleic acid sequence that has substantial sequence homology to a nucleic acid sequence of (a) or (b);
- (d) a nucleic acid sequence that is an analog of a nucleic acid sequence of (a), (b) or (c); or
- 15 (e) a nucleic acid sequence that hybridizes to a nucleic acid sequence of (a), (b), (c) or (d) under stringent hybridization conditions.

6. The method according to claim 1 wherein expression of said nucleic acid sequence of interest results in an alteration in protein or fatty acid composition in said seed.

7. Transgenic flax seed prepared according to a method comprising:

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- (a) preparing a chimeric nucleic acid construct comprising in the 5' to 3' direction of transcription as operably linked components:
- 25 (1) a seed-specific promoter obtained from flax; and
- (2) a nucleic acid sequence of interest wherein said nucleic acid of interest is non-native to said seed-specific promoter;
- (b) introducing said chimeric nucleic acid construct into a flax plant cell; and

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- (c) growing said flax plant cell into a mature flax plant capable of setting seed

wherein said nucleic acid sequence of interest is expressed in the seed under the control of said seed-specific promoter.

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- 5 8. Transgenic flax seed according to claim 7 wherein at least one expression characteristic conferred by said seed-specific promoter to its native nucleic acid sequence is conferred to said non-native nucleic acid sequence.

9. The method according to claim 8 wherein said expression
10 characteristic is timing of expression or level of expression.

10. Transgenic flax seed according to claim 8 wherein said seed-specific promoter is a seed storage protein promoter, an oleosin promoter, a 2S storage protein promoter or a legumin-like seed-storage protein promoter.

- 15 11. Transgenic flax seed according to claim 8 wherein said seed specific promoter comprises:

- (a) a nucleic acid sequence as shown in Figure 1 (SEQ.ID.NO.:1), Figure 2 (SEQ.ID.NO.:4), Figure 3 (SEQ.ID.NO.:6) or Figure 4 (SEQ.ID.NO.:8) wherein T can also be U;
- (b) a nucleic acid sequence that is complimentary to a nucleic acid sequence of (a);
- (c) a nucleic acid sequence that has substantial sequence homology to a nucleic acid sequence of (a) or (b);
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- (d) a nucleic acid sequence that is an analog of a nucleic acid
25 sequence of (a), (b) or (c); or

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- (e) a nucleic acid sequence that hybridizes to a nucleic acid sequence of (a), (b), (c) or (d) under stringent hybridization conditions,

12. Transgenic flax seed according to claim 8 wherein expression of said non-native gene of interest results in an alteration in the seed protein or fatty acid composition.

13. Transgenic flax plants capable of setting seed prepared by a method a method comprising:

- (a) preparing a chimeric nucleic acid construct comprising in the 5' to 3' direction of transcription as operably linked components:

- (1) a seed-specific promoter obtained from flax; and
(2) a nucleic acid sequence of interest wherein said nucleic acid of interest is non-native to said seed-specific promoter;

- (b) introducing said chimeric nucleic acid construct into a flax plant cell; and

- (c) growing said flax plant cell into a mature flax plant capable of setting seed

wherein said nucleic acid sequence of interest is expressed in the seed under the control of said seed-specific promoter.

14. An isolated nucleic acid sequence capable of directing seed-specific expression in a plant comprising:

- (a) a nucleic acid sequence as shown in Figure 1 (SEQ.ID.NO.:1), Figure 2 (SEQ.ID.NO.:4), Figure 3 (SEQ.ID.NO.:6) or Figure 4 (SEQ.ID.NO.:8) wherein T can also be U;

- (b) a nucleic acid sequence that is complimentary to a nucleic acid sequence of (a);

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- (c) a nucleic acid sequence that has substantial sequence homology to a nucleic acid sequence of (a) or (b); or
- (d) a nucleic acid sequence that is an analog of a nucleic acid sequence of (a), (b) or (c); or
- (e) a nucleic acid sequence that hybridizes to a nucleic acid sequence of (a), (b), (c) or (d) under stringent hybridization conditions.

15. An isolated chimeric nucleic acid sequence comprising:

- (a) a first nucleic acid sequence comprising a seed-specific promoter obtained from flax which comprises:
- (1) a nucleic acid sequence as shown in Figure 1 (SEQ.ID.NO.:1), Figure 2 (SEQ.ID.NO.:4), Figure 3 (SEQ.ID.NO.:6) or Figure 4 (SEQ.ID.NO.:8) wherein T can also be U;
 - (2) a nucleic acid sequence that hybridizes to a nucleic acid sequence of (a) under stringent hybridization conditions;
 - (3) a nucleic acid sequence that is complimentary to a nucleic acid sequence of (a); or
 - (4) a nucleic acid sequence that has substantial sequence homology to a nucleic acid sequence of (a); and
- (b) a second nucleic acid sequence non-native to said flax seed-specific promoter.

16. A method for the expression of a nucleic acid sequence of interest in a plant seed comprising:

- (a) introducing the chimeric nucleic acid sequence according to claim 15 into a plant cell; and
- (b) growing said plant cell into a mature plant capable of setting seed,

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wherein the second nucleic acid sequence is expressed in the seed under the control of the seed specific promoter.

17. A method according to claim 16 wherein said plant cell is selected from the group of plants consisting of soybean (*Glycine max*), rapeseed (*Brassica napus*, *Brassica campestris*), sunflower (*Helianthus annuus*), cotton (*Gossypium hirsutum*), corn (*Zea mays*), tobacco (*Nicotiana tabacum*), alfalfa (*Medicago sativa*), wheat (*Triticum sp.*), barley (*Hordeum vulgare*), oats (*Avena sativa L.*), sorghum (*Sorghum bicolor*), *Arabidopsis thaliana*, potato (*Solanum sp.*), flax/linseed (*Linum usitatissimum*), safflower (*Carthamus tinctorius*), oil palm (*Eleais guineensis*), groundnut (*Arachis hypogaea*), Brazil nut (*Bertholletia excelsa*) coconut (*Cocus nucifera*), castor (*Ricinus communis*), coriander (*Coriandrum sativum*), squash (*Cucurbita maxima*), jojoba (*Simmondsia chinensis*) and rice (*Oryza sativa*).

18. A plant prepared according to the method of claim 16.

19. A plant cell comprising the chimeric nucleic acid sequence according to claim 15.

20. Plant seed comprising the chimeric nucleic acid sequence according to claim 15.

21. Plant seed obtained from a plant prepared according to the method of claim 16.

22. A recombinant expression vector comprising a nucleic acid sequence according to claim 14.

23. A recombinant expression vector comprising a nucleic acid sequence according to claim 15.

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